

Mail Stop: APPEAL BRIEF - PATENTS

PATENT  
4001-1227

IN THE U.S. PATENT AND TRADEMARK OFFICE  
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re application of	Appeal No.
Frank ARNDT et al.	Conf. 5638
Application No. 10/590,962	Group 2837
Filed August 29, 2006	Examiner D. ROSENAU

CLADDING COMPRISING AN INTEGRATED POLYMER ACTUATOR FOR THE  
DEFORMATION OF SAID CLADDING

**APPEAL BRIEF**

Assistant Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

MAY IT PLEASE YOUR HONORS:

(i) **Real Party in Interest**

The real party in interest in this appeal is the  
assignee, Siemens AG of Munich, Germany.

(ii) **Related Appeals and Interferences**

None.

(iii) **Status of Claims**

Claims 1 and 3-10 are pending, and this appeal is taken  
from the final rejection of all of the pending claims.

(v) **Summary of the Claimed Subject Matter**

The claimed subject matter is directed to a cladding, which is described in two independent claims.

Independent claim 1 is directed to a cladding comprising:

an elastic boundary layer which forms the surface of the cladding, and

a polymer actuator in the form of a membrane actuator which forms the cladding for the deformation of the boundary layer,

*(Specification page 1, lines 4-7; the elastic boundary is exemplified by electrode layer 16a in Figure 1; the polymer actuary is exemplified by the electrically active polymer layer 15 in Figure 1.)*

wherein the cladding bears on a substrate by means of a bearing area which matches the surface area of the cladding in terms of magnitude and bears fully on the substrate, with only subregions of the bearing area being fixed to the substrate.

*(Specification page 2, lines 6-10.)*

Independent claim 6 is directed to a cladding comprising:

an elastic boundary layer which forms the surface of the cladding, and

a polymer actuator in the form of a membrane actuator which forms the cladding for the deformation of the boundary layer,

*(Specification page 1, lines 4-7.)*

wherein the cladding bears against a substrate by means of a bearing area which matches the surface area of the cladding in terms of magnitude and bears fully on the substrate, with the cladding being firmly connected to the substrate by means of the entire bearing area and having at least one electrode layer for the polymer actuator, which electrode layer extends only over a subregion of the polymer actuator.

*(Specification page 5, lines 1-5; Figure 3 shows polymer layer 15 connected to the substrate 12 over the entire surface area, as also described in the specification at page 9, lines 19-21; the honeycomb configuration of electrode 16a in Fig. 3 extends only over a subregion of the polymer actuator 15.)*

(vi) **Grounds of Rejection to be Reviewed on Appeal**

a. Whether claims 1, 3, 5, 6 and 9 would have been obvious, within the meaning of 35 U.S.C. § 103(a) over PELRINE et al. US 2002/0122561 (PELRINE) in view of NILSSON et al. US 4,539,575 (NILSSON);

b. Whether claim 4 would have been obvious, within the meaning of 35 U.S.C. § 103(a) over PELRINE in view of NILSSON and MAUSHARD et al. US 6,803,700 (MAUSHARD);

c. Whether claim 7 would have been obvious, within the meaning of 35 U.S.C. § 103(a) over PELRINE in view of NILSSON and KIHARA et al. U.S. 2002/0043901 (KIHARA);

d. Whether claim 8 would have been obvious, within the meaning of 35 U.S.C. § 103(a) over PELRINE in view of NILSSON and DYDYK U.S. 5,596,239 (DYDYK); and

e. Whether claim 10 would have been obvious, within the meaning of 35 U.S.C. § 103(a) over PELRINE in view of NILSSON, KIHARA and DYDYK.

(vii) Arguments

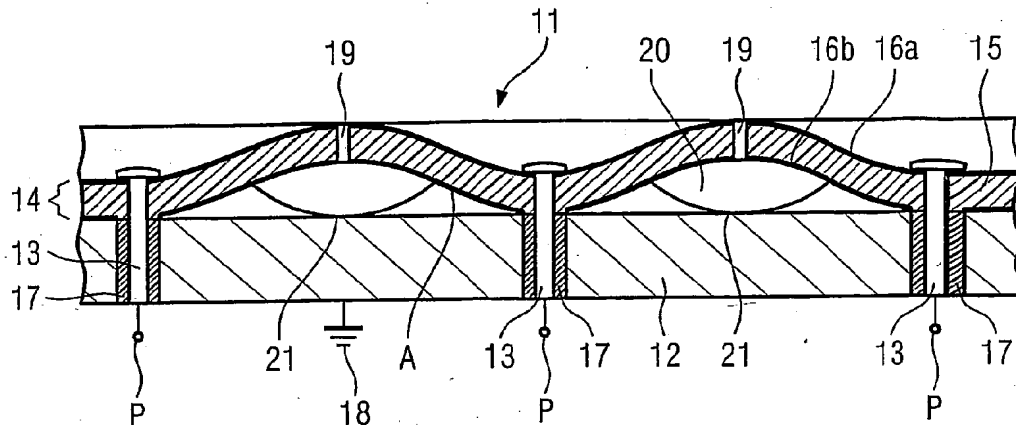
a. Claims 1, 3, 5, 6 and 9 are not obvious over PELRINE in view of NILSSON.

The claims are argued separately according to the two subheadings that follow.

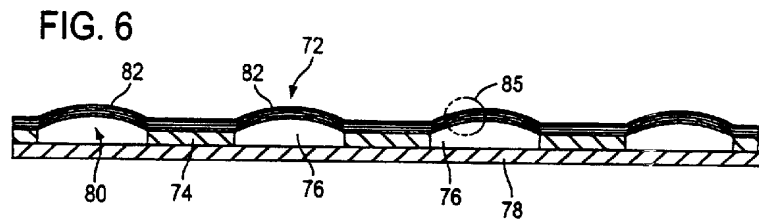
1. Claim 1, 3, 5 and 9

Independent claim 1 is directed to a cladding composition where the cladding (e.g., item 11 of Figure 1) bears on the substrate (item 12) at a bearing area (item A). This bearing area bears fully on the substrate, and the bearing area matches the surface area of the cladding in terms of magnitude. Only subregions of the bearing area, however, are fixed to substrate.

Claim 1 may be represented by Figure 1 of the present disclosure:



PELRINE was offered for teaching a cladding composition. PELRINE fails to disclose or suggest the bearing area and substrate structure of claim 1, as is apparent from Figure 6 of PELRINE:



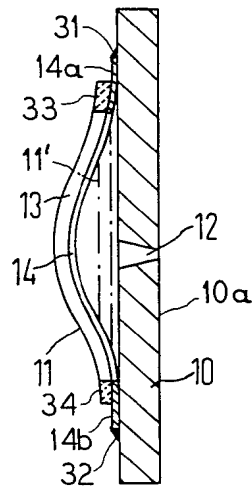
The "cladding", or elastic boundary layer 72, bears against both the support structure 74 and apertures 76.

Thus, because of the apertures, the cladding is not able to bear on the support structure by means of a "bearing area" which matches the surface of the cladding in terms of magnitude and bears fully on a substrate as recited in claim 1.

Furthermore, there is no suggestion of subregions of a bearing area being fixed to the substrate as recited in claim 1, as the entire region of the support structure is attached to the cladding.

NILSSON was offered for teaching cladding that bears on a substrate (item 10) by means of a bearing area which matches the surface area of the cladding in terms of magnitude.

However, similar to PELRINE, the "bearing area" of NILSSON is formed by the "cladding", i.e. membrane structure (items 13/14), bearing on both a substrate (item 10) and an opening (item 12), as shown in Figure 1 of NILSSON below:



Accordingly, due to the presence of the opening, the bearing area does not bear fully on the substrate, and this bearing area fails to match the surface area of the cladding in magnitude.

Thus, NILSSON is unable to remedy the deficiencies of PELRINE for reference purposes, and the combination fails to teach the features of claim 1.

The Examiner proposed at item 16 of the Official Action, however, that the piezoelectrically driven cladding of NILSSON "would replace the polymer actuator driven cladding" of PELRINE. The Examiner noted that this replacement would have resulted in the cladding of NILSSON, as shown in Figure 1 above, bearing on substrate 78 of PELRINE as shown above in Figure 6, i.e., rather than the support structure 74 and apertures 76. The Examiner asserted at item 18 that "it does not appear that

Pelrine requires such holes anywhere in the disclosure of Pelrine".

On the contrary, PELRINE requires these holes. The membrane of PELRINE is configured for vibrations. Because of the amplitude of these vibrations, the substrate must have holes to permit the substantially free vibration movement of the membrane.

PELRINE explains this in the abstract:

The support structure can take the form of grid having a number of circular apertures. When a voltage is applied to the electrodes, portions of the film held at the aperture of the support structure can bulge due to the electrostriction phenomenon. The resultant "bubbles" can be modulated to generate sonic vibrations, or can be used to create a variable surface for airflow control.

PELRINE further explains this concept in paragraph [0069], which refers to perforated support structure, and the "bubbles" which result from the portion of film over the perforated structure in paragraphs [0071]-[0073] and [0078].

Thus, to form a substrate without holes would have rendered the membrane/substrate structure of PELRINE unsatisfactory for its intended purpose.

Moreover, NILSSON fails to suggest the use the piezoelectrically driven cladding with a substrate without holes. Indeed, the purpose of NILSSON is to discharge a fluid through holes in the substrate. The fluid is held in a space between the cladding and the substrate, and the cladding flexes to force the

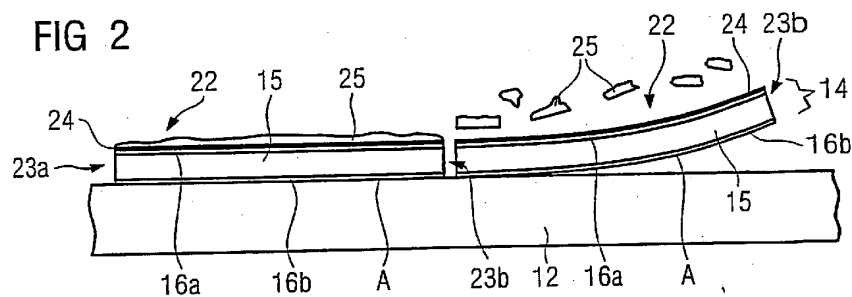


fluid out through the holes in the substrate. See, e.g., column 4, lines 25-56.

Therefore, the rejection of independent claim 1 and dependent claims 3, 5 and 9 is improper and should be reversed.

## 2. Claim 6

Independent claim 6, like independent claim 1, is directed to a cladding composition where the cladding (e.g., item 11 of Figure 1) bears on the substrate (item 12) at a bearing area (item A). This bearing area bears fully on the substrate, and the bearing area matches the surface area of the cladding in terms of magnitude. However, claim 6 differs from claim 1 in that the cladding is firmly connected to the substrate over the entire bearing area. Claim 6 may be represented by Figure 2 below:



Neither PELRINE nor NILSSON teach this type of "bearing area" wherein the cladding is firmly connected to the substrate over the entire bearing area.

As discussed above relative to claim 1, PELRINE requires that the elastic boundary layer 72 bears against both

support structure 74 and apertures 76 in order to provide the "bubbles" configured to provide free vibration movement of the elastic boundary layer, as well as a variable surface area for airflow control. See, e.g., Figure 6 of PELRINE above.

As also discussed above relative to claim 1, the bearing area of NILSSON is formed by the membrane structure (items 13/14), bearing on both a substrate (item 10) and an opening (item 12). The substrate releases a fluid held between the membrane and the substrate, through the opening in the substrate by the force of the flexible membrane.

Thus, in order to even approach the claimed bearing area, wherein the cladding is firmly connected to the substrate over the entire bearing area, would have rendered the structures suggested by PELRINE and NILSSON unsatisfactory for their intended purposes: sonic vibration/variable airflow control and fluid injection, respectively.

Therefore, the rejection of claim 6 is improper and should be reversed.

**b. Claim 4 is not obvious over  
PELRINE in view of NILSSON and MAUSHARD.**

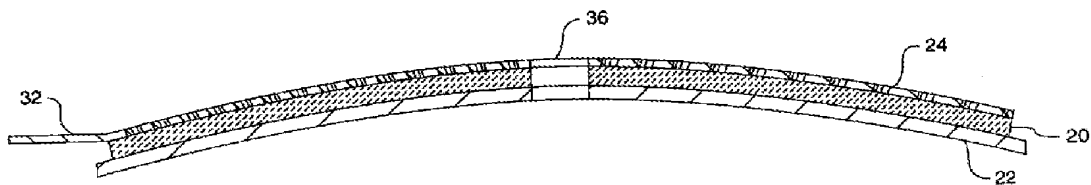
Claim 4 depends from claim 1. Claim 1 recites a cladding is provided with through-holes.

PELRINE and NILSSON were offered for the same reasons as discussed above.

MAUSHARD was offered for teaching a through-hole.

However, MAUSHARD relates to different structure than those suggested by either PELRINE or NILSSON, as well as that claimed. For example, there is no elastic boundary layer.

MAUSHARD discloses a substrate 22, ceramic layer 20 and a stiff metal layer 24, which includes a whole 36:



Indeed, the purpose of the hole, which is placed in the metal layer, is to improve the bending characteristics of the metal layer, i.e., "lessen the resistance to bending when the ceramic layer 20 is excited". See, e.g., Column 3, lines 35-43.

Thus, one of ordinary skill in the art would not have looked to modifying PELRINE given MAUSHARD, as the elastic material taught by PELRINE is not resistant to bending, as it responds to sonic vibration.

Moreover, one would not have expected any reasonable success from modifying the cladding of PELRINE in the same manner suggested by MAUSHARD.

MAUSHARD forms a hole in the metal layer to lessen the resistance to bending, otherwise the metal layer remains in contact with the ceramic layer. Accordingly, a hole formed in this manner in the PELRINE cladding would have destroyed the

bubbles, i.e., the holes would coincide with the apertures. As a result, this modification would have rendered apertures and elastic layer of PELRINE unsatisfactory for their intended purpose.

Therefore, the rejection of claim 6 is improper and should be reversed.

**c. Claim 7 is not obvious over  
PELRINE in view of NILSSON and KIHARA.**

Claim 7 depends from claim 6. Claim 7 recites that the electrode layer forms the webs of a honeycomb-like structure on the polymer layer.

PELRINE and NILSSON were offered for the same reasons as discussed above with respect to claim 6.

KIHARA was offered for teaching a honey-comb-like structure on the polymer layer.

However, PELRINE, as discussed previously, requires a solid structure to provide "bubbles" that respond to sonic vibrations and create a variable surface for airflow. As a honey-comb-like structure is different from a bubble, one would have expected this modification to render PELRINE unsatisfactory for its intended purpose.

Therefore, the rejection of claim 7 is improper and should be reversed.

**d. Claim 8 is not obvious over**

**PELRINE in view of NILSSON and DYDYK.**

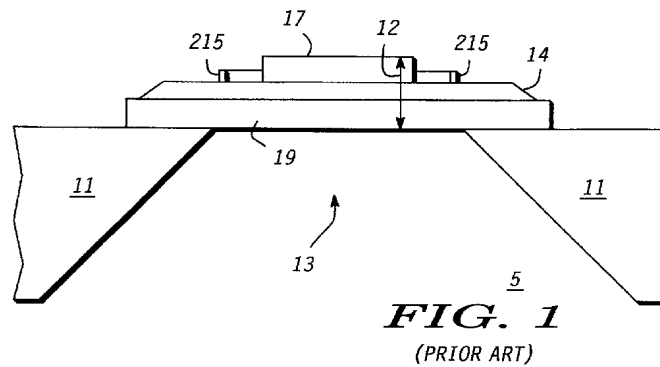
Claim 8 depends from claim 6, and further relates to an embodiment wherein the substrate forms an electrode for a polymer layer of the polymer actuator.

PELRINE and NILSSON were offered for the same reasons as discussed above with respect to claim 6.

DYDYK was offered for teaching a piezoelectric actuator in which the substrate forms an electrode for the piezoelectric layer of the actuator. The Examiner relied on Figure 3 in particular to support the rejection.

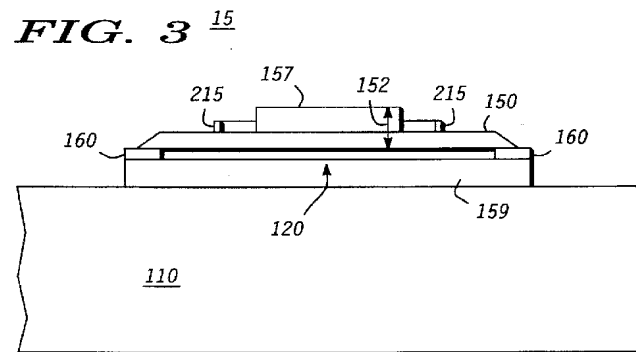
However, the prior art structure disclosed by DYDYK appears to have the similar hole structure suggested by PELRINE.

This prior art structure (see Figure 1 below) has a "cladding" comprising the electrode 19, a piezoelectric resonator layer 14 and a electrode 17, which DYDYK refers to as an actuator of a thickness of one half of an acoustic wave length. The substrate 11 includes a cavity 13, and, consequently, the "bearing area" of the cladding is much smaller than the surface area of the cladding. See, e.g., column 3, line 60 to column 4, line 42 of DYDYK and Figure 1:



Thus, similar to PELRINE, this prior art structure teaches away from the cladding described in claim 6, from which claim 8 depends, which is firmly connected to the substrate over the entire bearing area.

As to the actual invention of DYDYK, this is shown, for example, in Figure 3:



The substrate 110 solely contacts a non-elastic boundary layer (electrode 159 explained in column 5, lines 5-30).

Thus, the non-elastic layer in contact with a substrate is not only contrary to that of PELRINE, but to the claimed invention.

Alternatively, one may consider the "substrate" to be item 160, instead of item 110. Item 160 is in contact with an elastic boundary layer (items 150/157). This elastic boundary layer does not bear fully on "substrate" 160 such that the bearing area has the same magnitude as the surface area as the cladding, as there is a gap or aperture between with in the substrate 160 structure. However, even with this interpretation, DYDYK suggests an electrode arrangement in association with the same structure suggested PELRINE, i.e., one which includes apertures, and, thus, is dissimilar to the "bearing area" as recited in claim 6 from which claim 8 depends.

Accordingly, both the prior art and the invention of DYDYK teach away from the cladding and the bearing area described in claim 6, from which claim 8 depends.

Therefore, the rejection of claim 8 is improper and should be reversed.

**e. Claim 10 is not obvious over  
PELRINE in view of NILSSON, KIHARA and DYDYK.**

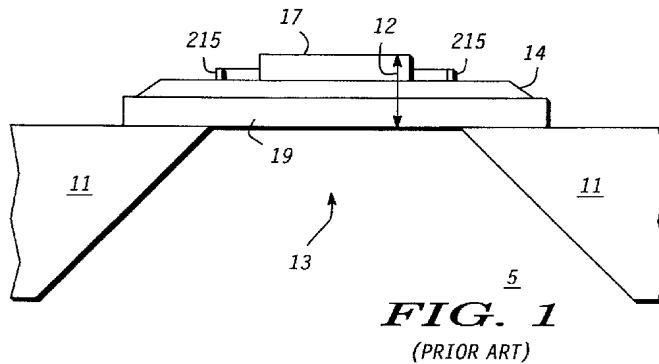
Claim 10 depends from claim 7, which depends from claim 6, and further relates to an embodiment wherein the substrate forms an electrode for a polymer layer of the polymer actuator.

PELRINE, NILSSON and KIHARA were offered for the same reasons as discussed above with respect to claim 7.

DYDYK was offered for teaching a piezoelectric actuator in which the substrate forms an electrode for the piezoelectric layer of the actuator. The Examiner relied on Figure 3 in particular to support the rejection.

However, the prior art structure disclosed by DYDYK appears to have the similar hole structure suggested by PELRINE.

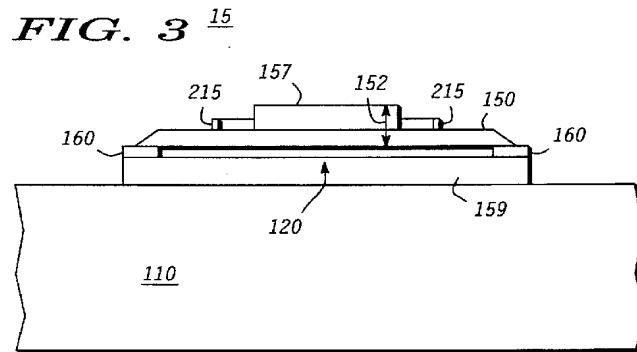
This prior art structure (see Figure 1 below) has a "cladding" comprising the electrode 19, a piezoelectric resonator layer 14 and a electrode 17, which DYDYK refers to as an actuator of a thickness of one half of an acoustic wave length. The substrate 11 includes a cavity 13, and, consequently, the "bearing area" of the cladding is much smaller than the surface area of the cladding. See, e.g., column 3, line 60 to column 4, line 42 of DYDYK and Figure 1:



Thus, similar to PELRINE, this prior art structure teaches away from the cladding described in claim 6, from which claim 10 ultimately depends, which is firmly connected to the substrate over the entire bearing area.



As to the actual invention of DYDYK, this is shown, for example, in Figure 3:



The substrate 110 solely contacts a non-elastic boundary layer (electrode 159 explained in column 5, lines 5-30).

Thus, the non-elastic layer in contact with a substrate is contrary not only contrary to that of PELRINE, as well as the claimed invention.

Alternatively, one may consider the "substrate" to be item 160, instead of item 110. Item 160 is in contact with an elastic boundary layer (items 150/157). This elastic boundary layer does not bear fully on "substrate" 160 such that the bearing area has the same magnitude as the surface area as the cladding, as there is a gap or aperture between with in the substrate 160 structure. However, even with this interpretation, DYDYK suggests an electrode arrangement in association with the same structure suggested PELRINE, i.e., one which includes apertures, and, thus, is dissimilar to the "bearing area" as recited in claim 6 from which claim 10 ultimately depends.

Accordingly, both the prior art and the invention of

DYDYK teach away from the cladding and the bearing area described in claim 6, from which claim 10 ultimately depends.

Therefore, the rejection of claim 10 is improper and should be reversed.

### **Conclusion**

From the foregoing discussion, it is believed to be apparent that the rejections on appeal are improper and should be reversed. Such action is accordingly respectfully requested.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future submissions, to charge any underpayment or credit any overpayment to Deposit Account No. 25-0120 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17.

Respectfully submitted,

YOUNG & THOMPSON

/Robert A. Madsen/  
Robert A. Madsen, Reg. No. 58,543  
Customer No. 00466  
209 Madison Street, Suite 500  
Alexandria, VA 22314  
Telephone (703) 521-2297  
Telefax (703) 685-0573  
(703) 979-4709

RAM/jr

June 15, 2010

(viii) **Claims Appendix**

1. A cladding comprising:

an elastic boundary layer which forms the surface of the cladding, and

a polymer actuator in the form of a membrane actuator which forms the cladding for the deformation of the boundary layer,

wherein the cladding bears on a substrate by means of a bearing area which matches the surface area of the cladding in terms of magnitude and bears fully on the substrate, with only subregions of the bearing area being fixed to the substrate.

3. The cladding as claimed in claim 1, wherein the cladding is fixed to the substrate at regular intervals in a punctiform manner.

4. The cladding as claimed in claim 1, wherein the cladding is provided with through-holes.

5. The cladding as claimed in claim 1, wherein said cladding is composed of individual lamellae which are each fixed to the substrate by means of one end, with the lamellae each being polymer actuators in the form of bending actuators.

6. A cladding comprising:

an elastic boundary layer which forms the surface of the cladding, and

a polymer actuator in the form of a membrane actuator which forms the cladding for the deformation of the boundary layer,

wherein the cladding bears against a substrate by means of a bearing area which matches the surface area of the cladding in terms of magnitude and bears fully on the substrate, with the cladding being firmly connected to the substrate by means of the entire bearing area and having at least one electrode layer for the polymer actuator, which electrode layer extends only over a subregion of the polymer actuator.

7. The cladding as claimed in claim 6, wherein the electrode layer forms the webs of a honeycomb-like structure on the polymer layer.

8. The cladding as claimed in claim 6, wherein the substrate forms an electrode for a polymer layer of the polymer actuator.

9. The cladding as claimed in claim 1, wherein the boundary layer is in the form of an auxiliary layer on the polymer actuator.

10. The cladding as claimed in claim 7, wherein the substrate forms an electrode for a polymer layer of the polymer actuator.

**(ix) Evidence Appendix**

None.

**(x)      Related Proceedings Appendix**

None.